

## REMARKS

The Applicants thank the Examiner for the careful examination of this application and respectfully request the entry of the amendments indicated hereinabove.

Claims 1-8 are pending and rejected. The Applicants respectfully note that the Office Action Summary page incorrectly lists the pending claims set as claims 1-7.

Independent Claim 1 positively recites depositing a first layer of copper grains having a first initial grain size over a copper seed layer, the first layer of copper grains being deposited by an electroplating process; and depositing a second layer of copper grains having a second initial grain size over the first layer of copper grains, the second layer of copper grains being deposited by an electroplating process. These advantageously claimed features are not taught or suggested by the patents granted to Park et al. or Andricacos et al., either alone or in combination.

Park et al. teaches away from the advantageously claimed invention by teaching a second Cu layer formed by electroplating, CVD, or sputtering (column 2 lines 44-48) Cu over a thin Cu layer (column 6 lines 29-32 and 54-59, column 2

lines 33-36 and 61-66) but not over a first layer of copper grains as advantageously claimed. This is because Park et al. teaches an annealing step that is a “necessary” treatment following the first layer of Cu grains (column 4 lines 32-34, column 5 lines 49-51, column 2 lines 34-35 and 61-65). Park et al. teaches that annealing is a necessary step after the deposition of the first electroplating film and before the deposition of the second copper film in order to “form a stable and generally void-free structure that, after annealing, is compatible with a subsequent thicker (large-grained) Cu layer created in a next cavity-filling deposition process” (column 36-39, see also 57-58).

The Applicants respectfully traverse the statement in the Office Action (page 4) that Andricacos et al. discloses “...the deposition of the copper layer in a three step electroplating process, wherein the composition of the copper filing is varied for the disclosed intended purpose of obtaining three different grain sizes...”. In addition, the applicants submit that Andricacos et al. discloses a single electroplating process (column 2 line 29, column 3 line 32, column 4 lines 45-46 and 58-59, column 5 lines 2-4, column 7 lines 39-42 and 43-46, column 8 lines 15-16 and 32-34, column 10 lines 5-6).

Therefore, the Applicants respectfully traverse the Examiner’s rejection of Claim 1 and respectfully assert that Claim 1 is patentable over the patents granted to Park et al. and Andricacos et al.; either alone or in combination.

Furthermore, Claims 2-6 are allowable for depending on allowable independent Claim 1 and, in combination, including limitations not taught or described in the references of record.

Independent Claim 7 positively recites depositing at least one additional layer of copper grains of differing initial grain sizes over the first layer of copper grains, the at least one additional layer of copper grains being deposited by an electroplating process. These advantageously claimed features are not taught or suggested by the patent granted to Park et al.

Park et al. teaches away from the advantageously claimed invention by teaching a second Cu layer formed by electroplating, CVD, or sputtering (column 2 lines 44-48) Cu over a thin Cu layer (column 6 lines 29-32 and 54-59, column 2 lines 33-36 and 61-66) but not over a first layer of copper grains as advantageously claimed. This is because Park et al. teaches an annealing step that is a “necessary” treatment following the first layer of Cu grains (column 4 lines 32-34, column 5 lines 49-51, column 2 lines 34-35 and 61-65). Park et al. teaches that annealing is a necessary step after the deposition of the first electroplating film and before the deposition of the second copper film in order to “form a stable and generally void-free structure that, after annealing, is compatible with a subsequent thicker (large-grained) Cu layer created in a next cavity-filling deposition process” (column 36-39, see also 57-58).

Therefore, the Applicants respectfully traverse the Examiner's rejection of Claim 7 and respectfully assert that Claim 7 is patentable over the patent granted to Park et al.

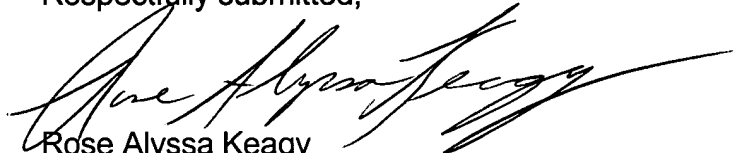
Independent Claim 8 positively recites depositing a second layer of copper grains having a second initial grain size over the first layer of copper grains. These advantageously claimed features are not taught or suggested by the patent granted to Park et al.

Park et al. teaches away from the advantageously claimed invention by teaching a second Cu layer formed by electroplating, CVD, or sputtering (column 2 lines 44-48) Cu over a thin Cu layer (column 6 lines 29-32 and 54-59, column 2 lines 33-36 and 61-66) but not over a first layer of copper grains as advantageously claimed. This is because Park et al. teaches an annealing step that is a "necessary" treatment following the first layer of Cu grains (column 4 lines 32-34, column 5 lines 49-51, column 2 lines 34-35 and 61-65). Park et al. teaches that annealing is a necessary step after the deposition of the first electroplating film and before the deposition of the second copper film in order to "form a stable and generally void-free structure that, after annealing, is compatible with a subsequent thicker (large-grained) Cu layer created in a next cavity-filling deposition process" (column 36-39, see also 57-58).

Therefore, the Applicants respectfully traverse the Examiner's rejection of Claim 8 and respectfully assert that Claim 8 is patentable over the patent granted to Park et al.

For the reasons stated above, this application is believed to be in condition for allowance. Reexamination and reconsideration is requested.

Respectfully submitted,



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